

What is claimed is:

1. A computer-readable medium having computer-executable
5 instructions for performing steps to communicate with a remote terminal for displaying graphic user interface, comprising:

receiving a drawing request to display a fragment on the remote terminal, the fragment including a plurality of glyphs;

determining whether the fragment has been cached in a
10 fragment cache at the remote terminal;

when it is determined that the fragment has been cached, sending a fragment index associated with the fragment to the remote terminal, the fragment index identifying an entry in the fragment cache that stores data representing the fragment.

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2. A computer-readable medium as in claim 1, having further computer-executable instructions for performing the steps of checking whether each of the glyphs in the fragment has been cached in glyph caches at the remote computer, and,
20 for a glyph in the fragment that has not been cached, sending graphic representation data for said glyph and a cell index to the remote terminal, the cell index identifying a cell in the glyph caches for storing the graphic representation data for said glyph.

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3. A computer-readable medium as in claim 2, having further computer-executable instructions for performing the

step of constructing a fragment glyph array containing a plurality of cell indices each identifying a cell in the glyph caches that stores graphic representation data for a glyph in the fragment.

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4. A computer-readable medium as in claim 3, having further computer-executable instructions for performing the step of generating from the fragment glyph array a fragment key for identifying the fragment to be displayed, and wherein
10 the step of determining whether the fragment has been cached includes checking a look-up table that lists fragment indices of fragments cached in the fragment cache at the remote terminal.

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5. A computer-readable medium as in claim 4, wherein the step of generating the fragment key includes applying a cryptographic checksum to the fragment glyph array.

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6. A computer-readable medium as in claim 5, having further computer-executable instructions for performing, when it is determined that the fragment has not been cached, the step of sending the fragment glyph array and a fragment index to the remote terminal, the fragment index identifying an entry in the fragment cache for storing the fragment glyph
25 array.

7. A method of operating a remote terminal under the control of a terminal server connected to the remote terminal through a network, comprising the steps of:

receiving, by the terminal server, a request to display a
5 fragment on the remote terminal, said fragment to be displayed including a plurality of glyphs;

determining by the terminal server whether each of the glyphs of the fragment to be displayed has been cached in glyph caches at the remote terminal;

10 when each of the glyphs of the fragment to be displayed is cached in the glyph caches, determining whether the fragment to be displayed has been cached in a fragment cache at the remote terminal;

obtaining, when the fragment to be displayed has been
15 cached in the fragment cache, a fragment index identifying an entry in the fragment cache corresponding to the fragment to be displayed, said entry in the fragment cache containing data identifying locations in the glyph caches whether graphic representation data for the glyphs of the fragment are stored;

20 sending, by the terminal server, the fragment index to the remote terminal;

retrieving, by the remote terminal, said entry in the fragment cache according to the fragment index;

retrieving, by the remote terminal, from the glyph caches
25 the graphic representation data for the glyphs in the fragment according to the data in the entry in the fragment cache; and

displaying, by the remote terminal, the fragment according to the graphic representation data retrieved from the glyph caches.

5 8. A method as in claim 7, further including the steps of sending, when a glyph in the fragment has not been cached, graphic representation data for said glyph and a cell index to the remote terminal, and storing, by the remote terminal, the graphic representation data in a cell of the glyph caches
10 corresponding to the cell index sent by the terminal server.

 9. A method as in claim 7, wherein the step of determining whether the fragment has been cached includes assigning a fragment key to the fragment for identification
15 thereof, and checking a look-up table listing fragment keys of fragments cached in the fragment cache at the remote terminal.

 10. A method as in claim 9, further including the step of constructing a fragment glyph array containing cell indices
20 associated with the glyphs of the fragment, each of the cell indices in the fragment glyph array corresponding to a glyph of the fragment and identifying a cell in the glyph caches that stores graphic representation data for said glyph.

25 11. A method as in claim 10, wherein the step of determining whether the fragment has been cached includes deriving a fragment key from the fragment glyph array, and

checking whether the fragment key exists in a look-up table listing fragments cached in the fragment cache at the remote computer.

5 12. A method as in claim 11, wherein the step of deriving the fragment key includes applying a cryptographic checksum function to the fragment glyph array.

10 13. A method as in claim 7, wherein the step of determining whether each of the glyphs of the fragment has been cached includes assigning for each glyph in the fragment a glyph key for identification thereof, and checking whether said glyph key is found in a look-up table maintained by the terminal server for identifying glyphs cached in the glyph
15 caches at the remote terminal.

20 14. A computer-readable medium having stored thereon a data structure, comprising at least a first table having a plurality of cells each containing graphic representation data for a glyph, and a second table having a plurality of entries each containing an array of cell indices corresponding to glyphs in a text fragment, each of the cell indices identifying a cell in said at least a first table.

25 15. A computer-readable medium as in claim 14, wherein the array of cell indices includes coordinate data representing separations between the glyphs in the fragment.

16. A computer-readable medium as in claim 15, wherein the coordinate data represent a space between two character glyphs.